What is claimed is:

1. A process for the production of cis-1,4-polybutadiene having a low level of gel content, the process comprising the step of polymerizing 1,3 butadiene in the presence of a catalyst and a polymerization diluent, the polymerization diluent comprising an organic solvent and water particles having a median particle size less than or equal to about 10 μm.

2. The process defined in claim 1, wherein the water is present in said polymerization diluent as particles having a median particle size in the range of from about 0.5 μm to about 8 μm.

3. The process defined in claim 1, wherein the water is present in said polymerization diluent as particles having a median particle size in the range of from about 0.5 μm to about 6 μm.

4. The process defined in claim 1, wherein the water is present in said polymerization diluent as particles having a median particle size in the range of from about 1 μm to about 5 μm.

5. The process defined in any one of claims 1-4, wherein the organic solvent is selected from the group comprising an aliphatic compound, an aromatic compound and mixtures thereof.

6. The process defined in claim 5, wherein the aliphatic compound is selected from a saturated hydrocarbon, an unsaturated hydrocarbon and mixtures thereof.

7. The process defined in claim 6, wherein the saturated hydrocarbon is selected from the group comprising C_4-C_{10} aliphatic hydrocarbon, a C_5-C_{10}

cyclic aliphatic hydrocarbon, a C_6-C_9 aromatic hydrocarbon, a C_2-C_{10} monoolefinic hydrocarbon and mixtures thereof.

8. The process defined in claim 7, wherein the C_4-C_{10} aliphatic hydrocarbon is selected from the group comprising butane, pentane, hexane, heptane, octane and mixtures thereof.

9. The process defined in claim 7, wherein the C_2-C_{10} monoolefinic hydrocarbon is selected from the group comprising butene-1, pentene-1, hexene-1 and mixtures thereof.

10. The process defined in claim 7, wherein the C_5-C_{10} cyclic aliphatic hydrocarbon is selected from the group comprising unsubstituted cycloalkanes, methyl substituted cycloalkanes, ethyl substituted cycloalkanes and mixtures thereof.

11. The process defined in claim 7, wherein the C_5-C_{10} cyclic aliphatic hydrocarbon is selected from the group comprising cylcopentane, cyclohexane, cyclooctane and mixtures thereof.

12. The process defined in claim 7, wherein the a C_6-C_9 aromatic hydrocarbon is selected from the group comprising benzene, toluene, xylene and mixtures thereof.

13. The process defined in any one of claims 1-4, wherein the organic solvent comprises a mixtures of cyclohexane and butene-1.

14. The process defined in any one of claims 1-13, wherein polymerization diluent further comprises a polymerization modifier selected from the group comprising C_2-C_{18} non-conjugated dienes, C_6-C_{12} cyclic dienes and mixtures thereof.

15. The process defined in claim 14, wherein the polymerization modifier is selected from the group comprising 1,2-butadiene, 1,3-cyclooctadiene, 1,5-cyclooctadiene and mixtures thereof.

16. The process defined in any one of claims 1-15, wherein the catalyst comprises a substantially anhydrous cobalt salt and an organo-aluminum halide compound.

17. The process defined in claim 16, wherein the substantially anhydrous cobalt salt comprises a compound having the formula CoA_m, wherein A is selected from a monovalent anion ~~and a divalent~~ anion, and m is 1 or 2.

18. The process defined in claim 17, wherein the anion is derived from a C_6-C_{12} organic acid.

19. The process defined in claim 17, wherein the anion is selected from the group comprising an acetylacetonate, an acetate, a hexanoate, an octoate, an oxalate, a tartrate, a stearate, a sorbate, an adipate and a naphthenate.

20. The process defined in claim 16, wherein the substantially anhydrous cobalt salt comprises cobalt octoate.

21. The process defined in any one of claims 16-20, wherein the organo-aluminum halide compound comprises a compound having the formula:

$$R_pAlX_q$$

wherein: R is a C_2-C_{12} alkyl group, X is a halogen and p+q is 3.

22. The process defined in any one of claims 16-20, wherein organo-aluminum halide compound is selected from the group comprising a dialkyl

aluminum chloride compound, an alkyl aluminum sesquichoride compound and mixtures thereof.

23. The process defined in any one of claims 16-20, wherein the organo-aluminum halide compound is selected from:

(I) a mixture of: (a) an alkyl aluminum chloride selected from diethyl aluminum chloride and ethyl aluminum sesquichloride and (b) an organo aluminum compound of formula R_3Al wherein R is C_8-C_{12} alkyl group; and

(II) an alkyl aluminum chloride wherein the alkyl group has 8 to 12 carbon atoms.

24. The process defined in any one of claims 16-20, wherein the organo aluminum halide comprises a mixture of: (a) an alkyl aluminum chloride selected from diethyl aluminum chloride and ethyl aluminum sesquichloride and (b) an organo aluminum compound of formula R_3Al wherein R is C_8-C_{12} alkyl group.

25. The process defined in any one of claims 23-24, wherein the organo aluminum compound of formula R_3Al is present in an amount of 0 to 1 percent by weight of the mixture.

26. The process defined in any one of claims 23-24, wherein the organo aluminum compound of formula R_3Al comprises tri-octyl aluminum.

27. The process defined in claim 16, wherein the substantially anhydrous cobalt salt comprises cobalt octoate and the organo-aluminum halide compound comprises a mixture of diethyl aluminum chloride and tri-octyl aluminum

28. The process defined in claim 27, wherein the molar ratio of cobalt octoate to the total of diethyl aluminum chloride plus tri-octyl aluminum is from about 1:15 to about 1:30.

29. The process defined in claim 27, wherein the molar ratio of chlorine in diethyl aluminum chloride to the total aluminum in diethyl aluminum chloride plus tri-octyl aluminum is from about 0.7:1 to about 0.95:1.

30. The process defined in any one of claims 1-29, wherein the water is mixed with the polymerization diluent by a mechanical method.

31. The process defined in any one of claims 1-29, wherein the water is mixed with the polymerization diluent by sonic treatment.

32. The process defined in any one of claims 1-31, wherein the polymerization temperature is in the range of from about 5° to about 40°C.

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